WHAT IS CLAIMED IS:

1. A laser oscillation apparatus comprising wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value,

wherein said wavelength change means calculates a driving amount of the wavelength selection element on the basis of the target value, drives the wavelength selection element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

2. The apparatus according to claim 1, wherein

the apparatus further comprises oscillation history memory means for storing an oscillation state of the laser beam as an oscillation history, and

said wavelength change means calculates the driving amount of the wavelength selection element on the basis of the oscillation history, drives the wavelength selection element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

3. The apparatus according to claim 2, wherein the oscillation history includes at least one of an oscillation wavelength change amount of the laser beam, an oscillation idle time of the laser beam, and an

oscillation duty.

4. The apparatus according to claim 1, wherein thresholds are set for the oscillation wavelength change amount of the laser beam and the oscillation idle time of the laser beam, whether the oscillation wavelength change amount of the laser beam or the oscillation idle time of the laser beam exceeds the threshold is determined, and a wavelength lock signal is output based on a determination result.

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5. The apparatus according to claim 4, wherein a shutter is closed when the oscillation wavelength change amount of the laser beam or the oscillation idle time of the laser beam exceeds the threshold.

6. The apparatus according to claim 1, further comprising wavelength measurement means for measuring the oscillation wavelength of the laser beam.

7. The apparatus according to claim 6, wherein the apparatus further comprises internal environment measurement means for measuring an internal environment of said wavelength measurement means, and said wavelength measurement means is corrected based on the measured internal environment of said wavelength measurement means.

8. The apparatus according to claim 7, wherein the internal environment of said wavelength measurement means includes at least one of a temperature and atmospheric pressure.

9. The apparatus according to claim 6, wherein whether the measured oscillation wavelength of the laser beam falls within a predetermined allowable range is determined, and a wavelength lock signal is output based on a determination result.

10. The apparatus according to claim 9, wherein output of the laser beam is stopped when the oscillation wavelength of the laser beam does not fall within the predetermined allowable range.

11. The apparatus according to claim 1, wherein output of the laser beam is not stopped in changing the oscillation wavelength of the laser beam.

12. The apparatus according to claim 1, wherein no test laser beam is emitted in changing the oscillation wavelength of the laser beam.

13. The apparatus according to claim 1, wherein the wavelength selection element includes one of a grating and etalon.

14. The apparatus according to claim 1, wherein the laser beam includes an excimer laser beam.

15. An exposure apparatus using a laser oscillation apparatus as a light source, wherein

the laser oscillation apparatus comprises wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value, and

said wavelength change means calculates a driving

amount of the wavelength selection element on the basis of the target value, drives the wavelength selection element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

16. The apparatus according to claim 15, wherein the oscillation wavelength of the laser beam is changed between end of exposure in a predetermined exposure region on a substrate to be exposed and start of exposure in a next exposure region.

17. A semiconductor device manufacturing method of manufacturing a semiconductor device by using an exposure apparatus, comprising the steps of:

applying a resist to a substrate;

drawing a pattern on the substrate by using the exposure apparatus; and

developing the substrate,

wherein the exposure apparatus uses as a light source a laser oscillation apparatus having wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value, and

the wavelength change means calculates a driving amount of the wavelength selection element on the basis of the target value, drives the wavelength selection element on the basis of the calculated driving amount of

the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

18. A semiconductor device manufacturing method comprising the steps of:

installing manufacturing apparatuses for various processes including an exposure apparatus in a semiconductor manufacturing factory; and

manufacturing a semiconductor device by using the manufacturing apparatuses in a plurality of processes,

wherein the exposure apparatus uses as a light source a laser oscillation apparatus having wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value, and

the wavelength change means calculates a driving amount of the wavelength selection element on the basis of the target value, drives the wavelength selection element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

19. The method according to claim 18, further comprising the steps of:

connecting the manufacturing apparatuses by a local area network; and

communicating information about at least one of

the manufacturing apparatuses between the local area network and an external network outside the semiconductor manufacturing factory.

20. The method according to claim 19, wherein a database provided by a vendor or user of the exposure apparatus is accessed via the external network to obtain maintenance information of the manufacturing apparatus by data communication, or production management is performed by data communication between the semiconductor manufacturing factory and another semiconductor manufacturing factory via the external network.

21. A semiconductor manufacturing factory comprising:

manufacturing apparatuses for various processes including an exposure apparatus;

a local area network for connecting said manufacturing apparatuses; and

a gateway which allows the local area network to access an external network outside the factory,

wherein information about at least one of said manufacturing apparatuses can be communicated,

said exposure apparatus uses as a light source a laser oscillation apparatus having wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value, and

said wavelength change means calculates a driving

amount of the wavelength selection element on the basis of the target value, drives the wavelength selection element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

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22. A maintenance method for an exposure apparatus installed in a semiconductor manufacturing factory, comprising the steps of:

causing a vendor or user of the exposure apparatus to provide a maintenance database connected to an external network of the semiconductor manufacturing factory;

authorizing access from the semiconductor manufacturing factory to the maintenance database via the external network; and

transmitting maintenance information accumulated in the maintenance database to the semiconductor manufacturing factory via the external network,

wherein the exposure apparatus uses as a light source a laser oscillation apparatus having wavelength change means for driving a wavelength selection element and changing an oscillation wavelength of a laser beam to a target value, and

the wavelength change means calculates a driving amount of the wavelength selection element on the basis of the target value, drives the wavelength selection

element on the basis of the calculated driving amount of the wavelength selection element, and changes the oscillation wavelength of the laser beam to the target value.

A10 cont'd.

23. The apparatus according to claim 15, wherein

the exposure apparatus further comprises a display, a network interface, and a computer for executing network software, and

maintenance information of the exposure apparatus can be communicated via the computer network.

24. The apparatus according to claim 23, characterized in that the network software is connected to an external network of a factory where the exposure apparatus is installed, provides on said display a user interface for accessing a maintenance database provided by a vendor or user of the exposure apparatus, and enables obtaining information from the database via the external network.